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Public Comment RE: Aquila Resources Back Forty wetlands application

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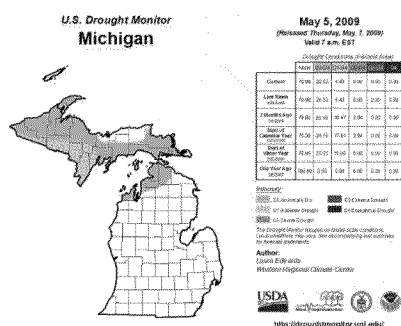
Expected impacts to wetlands from the proposed sulfide formation mining operation in Lake Township, MI, indicate that the Canadian Aquila Resources' Back Forty project is not in the public interest, and demonstrate a high likelihood of disruption to aquatic resources. Given that gold, and other metallic compounds sought on the banks of the Menominee River are already abundant in global markets, are recyclable, do not degrade over time, there are prudent alternatives that could be feasibly pursued by Aquila without disrupting Michigan wetlands and incurring losses to wetland-dependent biodiversity. Furthermore, intended uses of the property as an ore processing plant that would require importation and disposal of cyanide, as well as indefinite storage facility for waste rock tailings, are largely inappropriate given the location's proximity to an excellent fishery and regionally significant river. The disturbances caused by excavating bedrock and filling wetlands, transforming the topography and importing foreign materials (gravel, limestone, processing chemicals), will change the area's hydrography and water chemistry, leading to assured loss of habitat, biotic integrity, and wildlife. While these effects are certain to occur locally, the scale of incurrence is less certain, depending on the rate and severity of foreseeable incident.

Aquatic resources will be disrupted at all levels of wetland ecosystems, from reduced abundance and diversity of local invertebrate assemblages to lowered carrying capacity for wetland-dependent apex predators, if mining is permitted. Aquatic invertebrates, which build the foundation of ecological food webs and play a critical role in both terrestrial and aquatic nutrient cycling, are highly sensitive to changes in substrate availability, water chemistry, and flow pattern (Vannote and Sweeney 1980, Murkin 1988, Covich et al. 1999). Increased surface run-off, including run-off by fine particulate matter from tailings piles, will reduce substrate available to invertebrates in wetlands surrounding the project area. Excavated sulfide deposits, in conjunction with imported limestone rock, will undoubtedly change water quality in an extensive area as well as rain, wind, and air interact with the exposed piles for the duration of the mine's operation. It is important to note that high winds might carry fine particulate matter across long distances, increasing uncertainty in calculating the total area of wetlands affected at this most basic trophic level. Complete decimation of wetland invertebrates will occur within the project area, with the exception of mosquitoes, midges, and other pollution-tolerant taxa. These losses will include a diversity of dragonfly (Odonata), aquatic beetle (Coleoptera), caddisfly (Trichoptera), gastropod, and other species. Especially for the flying insects listed above, consequences of localized losses will extend to a much larger area.

Reduced abundance or diversity of the invertebrate community would have trophic effects on locally-occurring wetland-dependent or wetland-supported insectivores such as *Lithobates palustris* (Pickerel frog), *Necturus maculosus* (Mudpuppy), *Emydoidea blandingii* (Blanding's turtle), *Glyptemys insculpta* (Wood turtle), *Cistothorus palustris* (Marsh Wren), *Myotis lucifugus* (Little Brown Bat) and others. Loss of food availability will negatively affect these secondary consumers, which are also sensitive to environmental change. Conversion of wetlands to a processing plant, waste tailings piles, and active mining pit will disrupt these wetland species by creating disturbances such as light and noise pollution, destruction of habitat, and high

likelihood of a mass-contamination event due to the quantity and volatility of sulfide compounds proposed to be processed and stored on site. Any population loss at the secondary consumer level will bring about regional loss of higher-level predators, including species of special concern, such as *Opheodrys vernalis* (Smooth green snake), *Accipiter gentilis* (Northern goshawk), and others.

The acreage of affected wetland within the project boundary is underestimated. This is due, in part, to the above-discussed connections between local wetlands and regional biotic integrity. Additionally, many areas classified as wetland habitat by the NWI appear contracted in Aquila's wetland maps. It is possible that intermittent below average precipitation in recent years skewed field delineation of wetland as non-wetland. When environmental baseline studies were conducted by Aquila contractors 2007 through 2017, the project area experienced abnormally dry springtime (early April or May) conditions 5 years (2007, 2011, 2012, 2013, 2015), with moderate or severe drought conditions occurring two years (2010, 2009). Only four out of the eleven years (2008, 2014, 2016, 2017) had a spring with no drought recorded, and these patterns are due in part to highly variable winter precipitation conditions (US DROUGHT MONITOR). As the area recovers from intermittent dry-weather between 2007-2015, with no springtime occurrence of drought in 2016 and 2017, disruption of more than 45 acres of wetland will inhibit full recovery of sensitive populations. Recent drought occurrences may also influence Aquila's flood modelling, and estimation of risk for mass failure.



Aquila's estimations for total wetland impact also seem to suffer from a lack of data clarity, especially pertaining to the total volume of limestone that will be required to buffer the oxidization of sulfur in a region with naturally elevated concentrations of iron in the water. Furthermore, as tailings are to be disposed of in submerged conditions, there is potential for the limestone to 'armorize,' and not neutralize acidity effectively. Extreme measures, and volumes of limestone, would be necessary under these conditions to prevent catastrophic environmental damages due to Acid Mine Drainage. The current expected volume of tailings piles, as well as height, would in such as case by miscalculated by Aquila's conservative measurements, and wetland impacts grossly underestimated. The combination of naturally-occurring oxidizing metals in the groundwater, and the exposure of tailings piles to air, wind, and water for the duration of mine operation, along with the potential armorization of limestone, indicate the project is HIGHLY LIKELY to produce AMD. If not in an acute, catastrophic release, then by an equally damaging development of sub-equilibrium conditions where low levels of oxidized iron sulfide (pyrite) are produced and emitted from the project site, chronically for decades of even longer. AMD is already the leading environmental disaster associated with mining in North America, even in regions less apt to its development than a massive sulfide deposit with iron-containing groundwater, such as the targeted bedrock.

The foreseeable detriments to wetland habitat and the wildlife that depends on these environments will be a burden shared by the public, as the economic and intrinsic values of these natural resources are lost. Historically, the cost of cleaning up mine-related environmental damages is shouldered by the public. Benefits of the proposed activities, measured as economic gain for private investors with temporary dollar gains to the tax beneficiaries, are negligible when considering what is at stake. Wetland habitat will be cleared on 45 acres by mining activities, altering hydrology and water chemistry and destroying locally-dependent wildlife, with foreseeable disruptions to surrounding wetlands and loss of wetland biodiversity both locally and regionally. The region's high conduciveness for the development of catastrophic AMD risks decimation of fish and other aquatic resources of the Menominee River and Lake Michigan, and loss of dependent recreation and tourism industries.

Based on negligible benefits to the public when compared to foreseeable detriment, on the availability of prudent alternatives to metal mining in such close proximity to a regionally significant waterway, and on the disruption of wetlands and loss of wetland-derived benefits, there is no justification to grant a wetland permit to Aquila for the Back Forty mining project.